

DESCRIPTIONS OF SOUTH AUSTRALIAN BRACHYSCOLID GALLS.

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Plates III.-V.

The BRACHYSCOLIDÆ, a family of Coccids, appear to be entirely endemic to Australia, only extending in an aberrant form to New Zealand. At present the family is composed of a limited number of genera, of which the typical one contains most of the described species. The family with three of the genera was established by Schrader in 1862 on material collected in New South Wales, several species being described and figured by him in the "Transactions of the Entomological Society of New South Wales," vol. I., pages 1-8. His descriptions are, however, unmethodical, and therefore unsatisfactory.

Quite recently Mr. W. W. Froggatt published a further contribution in the "Proceedings of the Linnean Society of New South Wales," vol. VII., series 2, pp. 353-372, of which he most courteously and obligingly sent me a separate copy. In this he re-describes intelligently Schrader's species (5), and adds eight new ones of *Brachyscelis*, mostly illustrated by excellent figures.

Finding that these two papers constituted the whole literature of the subject of Brachyscelid galls, and that the work containing Schrader's figures existed in the S.A. Public Library, I compared those in the collection of the S.A. Museum (mostly brought together by myself) carefully with the published descriptions and figures, and found that nearly all our S.A. species were more or less widely different, and therefore new and undescribed, and that even the few which might possibly be included in one of the other species, were more or less aberrant in detail. Being precluded by a Museum regulation from communicating specimens of, or information on undescribed species to extra-South Australian specialists, I have myself worked up the subject, and present herewith the results as a contribution towards a more complete work of the future. The illustrations have all been drawn from the type specimens by myself, and represent them as truthfully as possible. The species are all figured for the first time.

The Brachyscelid galls form undoubtedly some of the most

wonderful transformed vegetable products on account of their symmetry, or regularity of form. They are produced by a minute, almost microscopic, insect lodging itself at the apex of an embryo-bud, either of a lateral, or terminal branchlet, flower, or seed vessel, and these grow around and over the insect in a fixed form, according to each species, instead of assuming simply an abortive form of their original habit, as in so many cases of other gall-forming insects. Each terminates one of the axes of the hostplant, be these twig, leaf, flower-bud, or young seed-vessel, and each contains only one of the originators in the genera *Brachyscelis*, *Sphaerococcus*, *Cylindricoccus* and *Frenchia* (the three last established by Mr. W. M. Maskell, but their position left undetermined, *Trans. N.Z. Inst.*, 1891), while in *Opisthoscelis* and *Ascelis* they are formed by the bulging out of the foliolar epidermis on one or both sides, and the space surrounding the insect filled by spongy, endodermic tissues.

The originating insects themselves (*i.e.*, within the same genus), as already remarked by Schrader, present such slight differences that they are almost unavailable for identification, and the working out of the causes producing the varied result in respect of the species will no doubt provide some future biologist with some most interesting study.

All Brachyscelid galls have a small or even minute opening or aperture at or near the centre of their summit, or exceptionally in the base. This communicates by means of a narrow channel of various lengths with an oval, oblong or cylindrical cavity, which is either more or less completely filled by the occupant, or more or less in excess of its size, and then usually more or less occupied by a fluffy, waxy exudation. The galls of the two sexes are widely differing in form and size. The male galls are always very much smaller, more or less elongated, forming cylindrical or conical tubes, and are either on the leaves, young twigs, or (rarely) on the female galls, occurring either singly, distantly scattered, in crowded clusters, or irregularly. The perfect male insect is described as being very minute, ranging from one-eighth of an inch to one-sixth, furnished with a pair of wings, perfect legs and antennæ, and two long anal setæ, or fine hairs. They have only been observed in a few species (no South Australian), and of some species even the male galls are still unknown.

The female galls, on the contrary, are mostly of very much larger size, of definite form for each species, and either placed singly on branchlets or forming crowded clusters on their terminations. In the latter case the galls are usually more or less distorted. A characteristic specific difference appears to be exhibited in the direction of the axis of the gall—that is, whether more or less vertical, lateral, or dependent. It seems self-evident

that this must be in reference to the established habit of each kind, and that it is essential to the wellbeing of the insect that its head, which is always directed to the point of attachment, *i.e.*, the *base* of the gall, either bear the weight of its body, or be relieved of it when lateral, or that the posterior end in pendant galls bear that weight.

A sectional difference appears to be afforded by the type of the form, *i.e.*, whether regular or symmetrical; in the former case all longitudinal sections are normally alike, in the latter only one such will produce similar halves—irregularity is always the result of abortion. The above differential characteristics I propose to use as a convenient artificial classification of the galls until further knowledge of the insects themselves may furnish a better one.

The female insect varies in form from broadly turbinate to elongated fusiform in the genus *Brachyscelis*. The head is completely fused with the thoracic segments, and separately undistinguishable; it is, therefore, included in the term "thoracic part of the body," and is usually thick and forms the greater portion of the bulk. There are eleven dorsal segments besides the last, which is very small and bears two subparallel, horny "tail bristles" of varying length. The segments are more or less constricted at their junction, those of the abdomen decreasing rapidly in diameter to the acute apex, and are either quite smooth, armed with short spinelets, or (especially those of the abdomen) more or less clothed with fine, sometimes rather long, hairs. Ventrally six, very short, three-jointed, widely separate legs are placed near the margin; the forelegs near the anterior extremity are the shortest; a little behind, and forming a triangle with them, is placed the minute mouth, or what is considered as such. Schrader says that "he could not detect the promuscis in his specimens, and was in doubt whether an opening existed," but in a large, fine specimen of my *B. ovicoloides* the latter appears to be quite distinct under a strong double lens, and Mr. Maskell describes the oral parts very succinctly in his genera. More in front and laterally the very short antennæ are placed near shallow, more or less indistinct, impressions considered as "eye spots." The former I have not been able to detect in the above specimen. The hindlegs are the largest, the forelegs shortest, and the others intermediary; all consist of three joints, the basal one being very much thicker than the others, the last very minute, bearing a minute simple claw. The colour in *Brachyscelis* is usually a paler or darker rusty-yellow or brownish tint, the terminal bristles being dark-brown or black. When alive the whole body is surrounded by a whitish, fluffy substance, exuded from the surface, of a waxy nature apparently, and which almost entirely dissolves in alcohol.

These remarks refer more especially to the above-named species, but apply more or less to all others. I have not myself observed the earlier stages, but Schrader states (l.c.) that the male impregnates the female through the narrow opening, and that she finally becomes a mere mass of eggs enclosed by the bare skin; that the young larvæ (l.c., i., figs. *h*, *b*) are microscopic, very active, flat, oval, margin fimbriated, with rather long, curious antennæ, and two very long terminal filaments.

Some species of *Brachyscelis* (perhaps all) are very prone to be affected by parasites, and not only the insects themselves, but the galls formed by them. The latter thus become very much distorted, and their form greatly modified. Examples are shewn on plate iii., fig. 1*g*, and plate iv., fig. 1*g*, fig. 2*f*. This action is so predominant in some instances that the host becomes stifled, the inner cavity wholly obsolete, and the shape so irregular as to be past recognition if seen by itself. Several species of Hymenoptera (inclusive of Chalcids), Coleoptera (*Scymnus*, *Haplonyx*, &c.), and a moth in chrysalis stage have been bred from some of the Mallee species. This prevalence of parasitism is no doubt the cause of the comparative rarity of most of them (except locally), notwithstanding the extraordinary protection of the prolific female.

Regarding duration of life of gall or insect nothing definite seems to be known. According to my own observations, the attainment to full size of the larger woody galls may require several years, the life of the female probably depending upon the access of males either earlier or later. Fecundation resulting, as is well known, in accelerated development and early death, and vice versa, among the *Articulata*.

In respect of distribution of *Brachyscelis* in South Australia, it may be remarked, that although I am familiar with them for nearly a lifetime, they were not found abundantly, except in isolated instances. The Mallee Eucalypts (*E. gracilis*, *dumosa*, *uncinata*, *oleosa*, and *incrassata*) furnish most of our species, while *Eucalyptus leucoxylon* harbours two, and *E. rostrata* three (one not yet described and figured) kinds. The Brachyscelid gall on *Beyeria opaca* (pl. v., fig. 3) is the first instance of such outside of Eucalyptus, hitherto the exclusive host, but it may prove to belong to another genus, when the gall-forming insect becomes known.

CLASSIFICATION OF THE FAMILY.

Schrader divided the BRACHYSCOLIDÆ into three genera. As his paper is long out of print, the following extract will perhaps be very acceptable to students of the family. He says on page 6:—"I propose to divide the gall-making Coccidæ as follows:—

"1. Genus BRACHYSCELIS. Where the females have six legs completely, but short and unfit for use.

"2. Genus OPISTHOSCELIS. Where they have only two long posterior legs.

"3. Genus ASCELIS. Where there are no vestiges of legs.

"The galls of the insects of the genus *Opisthoscelis* are often found male and female under the same leaf (plate v., *n*). The female gall is in the shape of a pea, but somewhat larger; the male galls very small and conical.

"The female *O. subrotundata* (iii., *n*) is of a crimson colour, nearly round, but the terminal segment of the abdomen very much tapered; it has very long posterior legs, but no traces of the anterior and intermediary legs. In another species, *O. gracilis*, the ovipositing female is rather slender, and the legs still longer and thinner, and the male has no anal setæ. . . . The larvæ resemble those of *Brachyscelis*, but have very short anal setæ. . . .

"In *Ascelis* the female larvæ alone form galls. The male larvæ undergo metamorphoses in the gall of the female. This is of pale-yellow colour, and loses nearly all traces of articulation. Only dark spots occur in place of the feet. On the back the animal has a horny instrument with three points, always holding some gum between them, which seems to serve for closing up the hole. The opening of the gall is not at the top, as in *Brachyscelis*, but on the other side of the leaf. The larva (plate iii., *n*) is flat, and transparently yellow, resembling that of *Brachyscelis*, but is never pointed at the apex, has shorter antennæ and setæ, and not as much fringing hair."

All the larvæ of the three genera have six short legs.

In 1891 Mr. W. M. Maskell (Trans. N.Z. Institute. Zool., 1891, pp. 39-45, and pp. 52-60) added the genera *Frenchia* (on Casuarina) and *Carteria* (on Melaleuca) to the BRACHYSCELIDÆ, and described and figured *Sphærococcus* and *Cylindrococcus* (also on Casuarina) as of uncertain position (but has lately formed a new sub-family, IDIOCOCCLINÆ, for their reception). On account of a general similarity of habit, I consider that they should also be included in the family. The first and two last form woody galls similar in structure to those of *Brachyscelis* (on Eucalypts and *Beyeria*); the second forms only thick waxy tests.

The adult female of *Frenchia* is tadpole-like, the abdominal portion being very long and slender, the thoracic very thick, circular, disk-like. Antennæ and legs absent. Colour reddish-yellow to dark brown. Larvæ elongated, flat, subelliptical, with legs and antennæ (i.e., pl. xiii.).

Of *Sphærococcus* the adult female is globular, grey in front, dark behind, with very small antennæ, but no feet. Larvæ

elliptical, elongated, abdomen rounded, with legs and antennæ (l.c., pl. viii., figs. 8-20).

Of *Cylindrococcus* (pl. ix.) the female is cylindrical, sides parallel, truncate in front, rounded behind, of red colour, antennæ short, conical, only the anterior legs developed, remainder merely indicated by dark patches. Larvæ with six long legs and two anal setæ.

In *Carteria* the thoracic part of the female is very large, sub-quadrated (the abdomen being very much and suddenly contracted, very much shorter than the former, and truncate), with two tubes and a horny spine dorsally, but without legs and antennæ. Colour red. The larvæ possess antennæ and long legs (l.c., pl. xii., figs. 1-10).

Mr. Maskell's descriptions and figures are exceedingly clear and painstaking, and I am very much obliged to him for his courtesy in remitting to me separate copies of his very valuable and authoritative papers.

Taking into account only what appears to be leading general characteristics, the family, as far as now known, may be synoptically epitomised as follows:—

FAMILY BRACHYSCELIDÆ.

Females large, inhabiting through life singly woody or spongy galls of more or less regular or symmetrical form, or rarely covered only by thick, waxy tests. Male larvæ in separate small galls or associated with the females; adults two-winged, minute.

1. Galls woody or spongy (on *Eucalyptus*, *Casuarina*, *Beyeria*).

2. Galls woody, developed in branches and twigs.

3. Female provided with legs, completely or partially.

4. Female provided with complete set of legs, three-jointed. (Body oval or fusiform; antennæ very short; on *Eucalyptus* and *Beyeria*?)

BRACHYSCELIS, *Schrader*.

4.4. Female provided with incomplete set of legs, remainder indicated by dark spots. (Body cylindrical; antennæ short, conical; on *Casuarina*.)

CYLINDROCOCCLUS, *Maskell*.

3.3. Female without legs (on branchlets of *Casuarina*).

4. Body of female globular; antennæ distinct.

SPHAEROCOCCLUS, *Maskell*.

4.4. Body tadpole-like, with two tubercular appendages, and a horny spine dorsally; antennæ absent. FRENCHIA, *Maskell*.

2.2. Galls spongy or leathery (on leaves of *Eucalyptus*).

3. Legs present in the female; hindlegs very long, remainder obsolete. (Body round anteriorly, tapering much behind; antennæ none.)

OPISTHOSCELIS, *Schrader*.

3.3. Legs absent. (Body subglobular, with a three-pointed horny appendage dorsally.) *ASCELIS*, Schrader.

1.1. Galls not formed; females covered by thick, waxy tests. (Thoracic part of body very bulky, abdominal short, narrow, truncate, antennæ and legs absent.) *CARTERIA*, Maskell.

Although the present paper is primarily concerned with the genus *Brachyscelis*, I have illustrated a species of leaf-gall (pl. iii., fig. 4) which by its external form belongs to *Opisthoscelis*, but the inhabiting insect—so far as I have been able to study it in some soaked and re-softened specimens—differs considerably from the females of that genus, and approaches *Ascelis* by the entire absence of legs. Hence I feel considerable diffidence in locating it with either, and place it only provisionally in the latter for the present, having some other species to notice in a future paper.

In the following list I have attempted tentatively to classify the galls of the genus *Brachyscelis* in regard to form and the position normally assumed by the insect during life, but the latter only applies more reliably to the species observed by myself, that of the others being inferred from the published figures, which may not have been drawn with strict regard of the position of the galls in situ, but rather to the available space. The authors rarely mention it in their remarks. In the present illustrations, which I have drawn from specimens gathered by myself chiefly, the direction of the branchlet indicates a more or less vertical one, whatever its position on the plate. (The figures of the galls of the Elder Exploring Expedition will be given on another plate with those of some others, yet undescribed in the collection at a future paper.)

LIST OF KNOWN GALLS OF BRACHYSCELIS.

A. Galls regular. (All longitudinal sections through the axis produce similar halves.)

a. Galls more or less erect.

Brachyscelis nunita, Schrader. On *Euc. robusta* (Frogg.), N.S.W., Victoria, Queensland; on *Euc. leucocorylon*, *gracilis* (Tepper), S.A.

regularis, sp. n. On *Euc. rostrata*, S.A.

subconica, sp. n. On *Euc. uncinata*, S.A.

urnalis, sp. nov. On *Euc. gracilis* (var. ?), S.A.

calycina, sp. n. On *Euc. oleosa* (?), *dumosa*, S.A.

Neumanni, sp. n. On *Euc. dumosa*, S.A.

Beyerii, sp. n. On *Beyeria opaca*, S.A.

a.a. Galls lateral or dependent.

b. Galls normally lateral.

Brachyscelis pomiformis, Frogg. On *Enc. sp.*, N.S.W., W.A.

ovicola, Schrader. On *Enc. gracilis, leucoxy-
lon*, N.S.W., Victoria.

Bäuerleni, Froggatt. On *Enc. sp.*, N.S.W.

rugosa, Froggatt. On *Enc. sp.*, N.S.W.

strombylosa, sp. n. On *Enc. incrassata*, S.A.

b.b. Galls more or less dependent.

Brachyscelis minor, Froggatt. On *Enc. hæmastoma*, N.S.W.

conica, Froggatt. On *Enc. viminalis*, N.S.W.

B. Galls symmetrical. (Only one section along main axis produces similar halves.)

a. Galls mostly directed laterally in the normal form and position.

Brachyscelis variabilis, Froggatt. On *Enc. piperita*, N.S.W.

pharetrata, Schrader. On *Enc. Sieberiana, corymbosa, and capitellata*, N.S.W.

Thorntoni, Froggatt. On *Enc. sp.*, N.S.W.

ovicoloides, sp. n. On *Enc. incrassata*, S.A.

a.a. Galls mostly dependent.

Brachyscelis duplex, Schrader. On *Enc. spec.*, N.S.W., Queensland.

pileata, Schrader. On *Enc. piperita, Sieberiana, and capitellata*, N.S.W.

glabra, sp. nov. On *Enc. rostrata*, S.A.

ellipsoidalis, sp. nov. On *Enc. sp.*, Fraser Range, W.A. (Elder Exploring Expedition).

The following works have been consulted and made use of :—

1. H. L. SCHRADER—"Observations on Certain Gall-making Coccidæ of Australia," in Transactions of Entomological Society of N.S. Wales, 1862, vol. I., pp. 1-5. "Further Communications on the Gall-making Coccidæ," *ibid.*

2. W. M. MASKELL—"Further Coccid Notes, with Descriptions of New Species, and Remarks on Coccids from New Zealand, Australia, and elsewhere," in Transactions of New Zealand Institute, 1891, I. Zoology, pp. 1-67.

3. W. W. FROGGATT—"Notes on the Family Brachyscelidæ, with some Account of their Parasites, and Description of New Species," in Proceedings of the Linnean Society of N.S. Wales, Series 2, vol. VII., 1892, pp. 353-372.

DESCRIPTION OF S.A. SPECIES OF BRACHYSCELID GALLS.

BRACHYSCELIS MUNITA, *Schrader*.

(Trans. Ent. Soc. N.S.W., 1862; vol. I. 5; plate ii.,
fig. *A, h, l, o, s.*) (Plate iii., fig. 1).

The typical form as described by Schrader is shown in outline by *A.*, fig. 1, plate iii., which is an approximate copy of the original figure, and has not been observed by me in South Australia. The shape usually seen is delineated by fig. 1, *B.* The four prolongations, continued along the gall as more or less crest-like ridges attain sometimes several inches in length, but are always much recurved or contracted irregularly. When occurring in crowded clusters, as is sometimes the case, the galls become mostly very much deformed. Some of the ridges or all of them become obsolete, and the appendages less in number and much reduced in length and thickness (in my opinion they probably represent midribs of four leaves composing the gall), yet the typical form can still be recognised. The variety shown at *C* (pl. iii.) appears to be rare, and only appearing solitarily. It might be distinguished as *var. foliosa*, and is only met with on very young shoots with broad leaves indicative of immature age. A form very much reduced in size occurs by no means rarely on certain "Mallee" Eucalypts (*D*, pl. iii.; fig. *2h.*, pl. iv.), which I propose to distinguish as *var. reducta* until its relationship be more closely studied.

The male galls are narrowly tubular, small, and crowded together in subglobular clusters of very numerous individuals at the ends of small branchlets.

Habitat.—Distributed throughout Southern and Eastern Australia.

BRACHYSCELIS REGULARIS, *spec. nov.* (Pl. iii., fig. 3, *3a.*)

Female gall. Solitary, erect, regular, conical both ends; apex truncate, slightly narrower than the base, the stalk of which is somewhat elongated and generally attenuated as well as the apex. Aperture very small, circular, level with the narrow rim, which is slightly and very shortly annulated. Exterior nearly smooth, whitish or brownish, slightly striated and roughened by low irregular, subconical protuberances (remains of male galls?), and transverse ridgelets. Internal cavity comparatively narrow, tapering almost equally towards either end. Insect not observed. Male galls unknown.

Length of gall, 56 mm.; diameter (max.), 21 mm.

Habitat.—Murray Bridge, Lyndoch, &c. On *Eucalyptus rostrata*, Schlecht; rather rare.

BRACHYSCELIS SUBCONICA, *spec. nov.* (Pl. iv., fig. 1.)

Female gall. Solitary or in pairs, often several or many on the same leafy branchlet, but not crowded; regular, conical on both ends, apex at first acutely pyramidal, finally obtuse, furnished with several distinct annulations. Aperture circular, mostly minute, rim very narrow. Exterior green, longitudinally striated, smooth, finally greyish-black or brown, more or less scaly rugose. Cavity cylindrical, anteriorly funnel-like, posteriorly semicircular. Female insect small, narrowly fusiform, tail-bristles moderately long.

Length of gall, 25–30 mm. : diameter do., 8–10 mm.

Male gall. Narrowly tubular, distinctly curved, rim dilated; mostly turned downwards or sideways; yellowish-green to red; either almost singly or crowded in rows on the leaves near the female galls, usually much more numerous on one surface than on the other. Insect not seen.

Length, 4–10 mm. ; diameter, 1–1.3 mm.

Habitat.—Murray Bridge. On *Eucalyptus uncinata*, F. v. M.

The species is not uncommon in the Mallee scrub near the locality, and may occur elsewhere. In its erect habit, and more elongated, slender form it differs from *B. conica*, Frogg., which, according to his figures, is more or less dependent. The respective male galls present also a different habit, being developed on the leaves, while those of the latter are situated on the branchlets.

Many of the female galls are found so crowded with chalcid parasites that they become wholly unlike the original, and in some cases the originating insect has been choked, the cavity disappearing.

BRACHYSCELIS URNALIS, *sp. nov.* (Pl. iv., fig. 2.)

Female gall. Very regular, mostly solitary, rarely two to four crowded together at the ends of small twigs; urn-shaped, basal part obconical, base narrow usually (rarely incrassated), neck more or less conical, narrow, elongated; rim wide, flat, formed of obtuse, irregular, divergent lobes: inner disk slightly depressed or raised, colour mostly brown; aperture central, very minute. Exterior nearly smooth, slightly striated longitudinally, brownish green or grey. Cavity cylindrical with long narrow channel anteriorly. Female insect small, elongate fusiform, hairs long, tail bristles moderately long, very slender.

Male galls. Very small, scattered along the small twigs near the females, not crowded, conico-cylindrical, apex not dilated. Insects not seen.

	Male.	Female.
Maximum length of gall ...	2–3 mm.	18–25 mm.
Maximum length of neck ...	—	3–8 “
Maximum diameter of gall ...	0.7–1 “	5–14 “
Maximum diameter of neck...	—	2–3 “
Maximum diameter of rim ...	—	6–8 “

Habitat.—Murray Bridge, South Australia.

These are the most beautifully-shaped galls known to me, and occur on a stunted species of Eucalypts allied to *Enc. uncinata* and *Enc. gracilis*, but differing from either, and not agreeing precisely with any described kind. The seed-vessels are mostly prominently four-keeled, and the rather small flowers reddish to crimson. Many of the galls are more or less abortive through excessive attack of minute hymenopterous parasites, others exhibit a large, more or less laterally placed hole, showing the exit of some larger parasite, which had fed upon the inhabitant itself. Associated with this species are found small, more or less abortive galls of *B. reducta* (pl. iv., fig. 2*h*.) The specimen shown at "a," and remarkable for its broad, clasping base, was still green when picked, and the only one of this form met with.

BRACHYSCELIS CALYCINA, *spec. nov.* (Pl. v., fig. 1*a-d*.)

Female gall. Solitary, rarely a few together, regular, cup-shaped, sessile on the sides or ends of branchlets, obliquely erect; base broad, sometimes an incrassated ring, gradually dilated to the irregularly dentated rim; disk depressed, an elevated small cone in the centre, exceeding the rim, and containing the minute aperture. Exterior rough, dark-brown, disk blackish. Cavity oval, channel moderately long, tubular. Insect not seen alive, in dead specimens, fusiform, about half an inch long, pale ferruginous, two last abdominal segments very slender; tail bristles black, nearly as long as the two last abdominal segments together.

Male gall. Almost cylindro-tubular, very slender, nearly straight, pale-green, rim not dilated. Scattered along and around very young twigs, never on leaves.

	Male.	Female.
Maximum length of gall ...	2-3 mm.	15-25 mm.
Maximum diameter of base	0.7-1.0 "	4-8 "
Maximum diameter of rim ...	—	9-15 "

Habitat.—Murray Bridge, Goolwa, Kangaroo Island.

These remarkable galls occur on stunted bushes of *Eucalyptus dumosa* and *E. oleosa*. When young and still green and immature they resemble the corresponding stage of some of the individuals of the next species, but are never crowded. They are also found occasionally much parasitised and abortive.

BRACHYSCELIS NEUMANNI, *spec. nov.* (Pl. v., fig. 2*a-d*.)

Female gall. Semi-erect, aggregated in dense clusters of many individuals of both sexes, flexuose-cylindrical, base surrounded by a thicker ring, middle slightly bulging, slightly contracted below the rim, latter not much dilated, often divided into two parts by deep incisions, always irregularly dentate; disk slightly depressed,

central cone scarcely raised above the outer margin, aperture minute. Exterior reddish brown, somewhat glossy, striated longitudinally and irregularly rugulose. Cavity elongate cylindrical, base either semicircular or the lower part greatly contracted; apical channel short and more or less funnel-like. Insect not observed.

Male gall (?). Tubular to trumpet-shaped, apex much dilated, rim dentate or lobate, recurved, with a small central cone; intermixed with the female galls in the same clusters. Insect not known.

	Male.	Female.
Maximum length of gall ...	8 - 25 mm.	18-30 mm.
Maximum diameter at base ...	1.5 " "	5- 9 " "
Maximum diameter in the middle	1.5- 2 " "	8-10 " "
Maximum diameter of the rim ...	3 - 5 " "	9-11 " "

Habitat.—Murray Bridge. In large clusters on the erect or suberect stout branchlets and twigs of *Eucalyptus dumosa*, causing the death of the branch on which they are situated. The species is named after my old friend Mr. J. G. Neumann, who resides at the locality named, and has always assisted me and other friends of natural history most disinterestedly in the pursuit of researches in his neighbourhood, and has also liberally contributed to the collections of the S.A. Museum.

BRACHYSCELIS (?) BEYERLE, *spec. nov.* (Pl. v., fig. 3a-f.)

Female gall. Solitary, on the end of branchlets of *Beyeria opaca*, rarely in pairs, oval, or sometimes subfusiform, composed of the fused altered leaves; apex slightly elongated, or chiefly occupied by the comparatively large aperture. Exterior greenish when alive, smooth, marked by the edges and midribs of the leaves denoted by slight ridges. Cavity elongate ovate; channel short, large. Insects not known.

Male galls. Several together along the branchlets below the female galls, minute, tubular, curved. Insect not known.

	Male.	Female.
Length of gall ...	1.5-2 mm.	11-22 mm.
Diameter of gall...	0.5-1.0 " "	5- 8 " "

Habitat.—Ardrossan, Yorke's Peninsula.

This species, if it be a true *Brachyscelis*, would be the first instance of such occurring outside of the genus *Eucalyptus*, the plant belonging to the Euphorbiaceæ. On account of the similarity of type form of the galls, I insert it here provisionally, as the insects are unknown. Their study will probably necessitate its removal to a separate genus. The specimens from which I have drawn the figure were gathered by myself in 1885.

BRACHYSCELIS STROMBYLOSA, *spec. nov.* (Pl. iv., fig. 3a-c.)

Female gall. Solitary, suborbicular, sessile, often more or less oblique and turned in the direction of the branchlet. Exterior, when young, formed of numerous, subconical or suborbicular tubercules, which become more irregular with age; apex truncate, crateriform, central cone lower than the margin; aperture small, usually circular, sometimes oval. Cavity large, broadly oval, inner surface somewhat irregular, channel funnel-like, short. Insect not known. *Male galls* not observed.

Length of gall, 18-26 mm. ; diameter of gall, 20-25 mm.

Habitat.—Murray Bridge. These galls occur sparingly on the stouter branches and branchlets of *Eucalyptus incrassata*, and are so firmly fixed, that they can only be detached with some difficulty, being themselves very firm and woody. The outer walls are very thick and solid, and are mined by fair-sized larvæ, apparently of some weevils. A specimen of a *Haplonyx* was doubtfully bred from one of them.

BRACHYSCELIS OVICOLOIDES, *sp. nov.* (Pl. iii., fig. 2a-f.)

Female gall. Solitary, nearly sessile, elongate oval, always curved much and obliquely away from the point of attachment, and frequently much curved dorsally (much more even than in the figure, pl. 1a); exterior bright-green, like the leaves, slightly wrinkled longitudinally; apex truncate, brownish, rim flat, broad, centre of disk slightly depressed, without central cone; aperture small, circular. Cavity ovate, smooth, channel short, funnel-like; walls of equal thickness throughout, and composed of three layers, viz., (1) exterior, thin, green, bark-like; (2) intermediary, thick, formed of conspicuous cavities filled with a viscous gummy substance when fresh; (3) innermost, thin, whitish, composed of longitudinal fibres.

Length of gall, 23-35 mm. ; diameter, middle 13-16 mm., apex 4-7 mm.

Female insect piceous above; a pale, broad, undefined, longitudinal patch on the anterior part of the dorsum; underside dark shining brown or black, last four abdominal segments yellowish, apex brownish; anterior part of body smooth, abdomen with short, distant bristles. Head indistinct, antennæ and eyes obsolete apparently. Legs six, three-jointed; basal joint much larger than the following, terminal joint with a very minute simple claw. Anterior pair smallest, posterior largest. Terminal bristles two, very short.

Length of body, 23 mm. ; of head and thorax, 13 mm. ; of anterior legs, 0.6 mm. ; of posterior legs, 1.5 mm. ; of terminal bristles, 1 mm. ; width of thorax, 10.7 mm.

Male galls. Solitary, scattered or crowded on the leaves, or

singly sometimes on the green seed-vessels; cup-shaped to tubular, thick, apex more or less dilated, green to reddish-brown.

Length, 3–6 mm.; diameter in the middle, 2·5–3·5 mm.; at apex, 3–3·7 mm.

Habitat.—Moonta, Yorke's Peninsula (*T. Jones*).

The galls are found scattered on the branchlets of *Eucalyptus incrassata*, and perhaps *E. odorata*. They appear to differ from *B. ovicola*, Schrad., by being symmetrical instead of regular in form, much more curved, and the apex almost flat, the insect itself differing in colour, size, &c. Fig. "d" shows the view of the inside above the dotted line of "a."

BRACHYSCELIS GLABRA, *spec. nov.* (Pl. iii., fig. 4.)

Female gall. Solitary, sessile, considerably projecting beyond point of attachment posteriorly, ovate, nearly smooth, faintly striated longitudinally, and sometimes with irregular, smooth warts (male galls?), whitish or grey, clouded with brown; apex rounded, aperture very minute; cavity rather large, corresponding in form with the external shape. Insect not known, nor the male galls.

Length, 28 mm.; diameter over attachment, 15 mm.; at apex, 3·5 mm.

Habitat.—Mount Lofty Ranges, Lyndoch, &c. On stout branchlets of *Eucalyptus rostrata*, but rather rare, and always solitary. The outer texture resembles that of the bark of the branches very remarkably.

ASCELIS, *Schrader*.

Female without legs. Galls globular or subglobular, spongy or leathery, smooth when fresh; extending either to both sides equally, or situated wholly on one side alone, in which case the opening is through the lamina of the leaf (?).

ASCELIS (?) MULTITUDINEA, *spec. nov.* (Pl. v., fig. 4.)

Female gall. Obovate orbicular (when fresh), smooth, green, wholly on one side of leaf, aperture scarcely perceptible when young, at or near summit, conspicuous when mature. Circular area at base small, depressed on opposite side of leaf.

Female insect yellow, rather flat, elliptical, slightly covered with long hairs; segments distinct, constricted, margin conspicuously lobate, head subanterior, mouth in a circular slightly protruding area; antennæ dorsal, very minute, close together, conical, blackish. Legs, none. Stigmata conspicuous as black points, slightly raised above the surface (in old and softened specimen); last segment of abdomen deeply emarginate, the sides forming thick, obtusely acuminate appendages, without bristles or setæ.

Length of gall, 8–11 mm.; diameter of gall, 6–9 mm.; length of insect, 3·5 mm.; width of insect, 2 mm.

Habitat.—Marino, South-Eastern District of South Australia.

The specimen in the collection of the S.A. Museum was presented by Mr. A. Molineux, the genial and zealous Secretary of the Bureau of Agriculture, from the above locality, in March, 1885. The numerous galls (54 in all) are distributed over a large, not quite perfect, leaf of one of the "Stringybark" gums, and arranged in short, more or less irregular, rows of three to five, but not crowded. They resemble the galls of *Opisthoscelis* in form and the position of the aperture, but the insects differ from those of the latter genus in form of body and entire absence of legs, and from those of *Ascelis*, as limited by Schrader, also in form of body and the absence of the trispinose dorsal appendage. More and fresher material is, however, required for critical examination before a conclusive decision respecting the position of the species can be arrived at.

EXPLANATION OF THE ILLUSTRATIONS.

PLATE III.

- Fig. 1. *Brachyscelis munita*, Schrader. Female galls. Nat. size.
A. Typical form; outline of Schrader's figure.
B. Usual form with narrow contorted appendages.
C. *Var. foliosa*, var. nov., with leaf-like appendages.
D. *Var. reducta*. Small form on mallee Eucalypts.
- Fig. 2. *Brachyscelis oricoloides*, spec. nov. Male and female galls. Nat. size.
a. Normal form of female galls on twigs; young and mature form.
b, b, b. Normal form of male galls in various stages on leaves.
c. Male gall on seed vessel.
d. Dorsal half of female gall, showing form of cavity.
e, f. Dorsal and ventral view of female, nat. size.
- Fig. 3. *Brachyscelis regularis*, spec. nov. Female gall. Natural size.
 Fig. 3a. Abortive form of same, through parasites.
- Fig. 4. *Brachyscelis glabra*, spec. nov. Female gall. Natural size.

PLATE IV.

- Fig. 1. *Brachyscelis subconica*, spec. nov. Natural size.
a. Old, dry female gall, roughened by tubercles.
b. Living female gall, more than half-grown, showing annuli at apex.
c, d. Young galls in various stages (contorted).
e. Solitary; *f.* aggregated male galls.
g. Parasitised and abortive female gall, affected by Chalcids.

- Fig 2. *Brachyscelis urnalis*, spec. nov. Natural size.
a. Abnormal sessile female gall.
b. Aggregated abnormal galls, distorted and bored by parasites.
c. Normal female gall (bored by a parasite at the side of the cone).
d. Young female galls.
e. Male galls on twigs.
f. Abortive female galls, affected by Chalcids.
g. Section of female gall.
h. Small abortive galls of *B. reducta*.
i. Female insect, underside.
- Fig. 3. *Brachyscelis strombylosa*, spec. nov. Natural size.
a, a. Old female galls. *b.* Nearly fullgrown gall.
c. Section of old gall, showing peculiar form of cavity, and the tunnelling of Curculionid larvæ in the walls.

PLATE V.

- Fig. 1. *Brachyscelis calycina*, spec. nov. Natural size.
a, a. Three mature galls, one stalked, two sessile, in various positions.
b. Three younger female galls.
c. Section of half-grown female gall, showing cavity and channel.
d, d. Male galls around young twigs.
- Fig. 2. *Brachyscelis Neumanni*, spec. nov. Natural size.
a. Normal form of female gall.
b. Abnormal form of female gall.
c. Male galls (?) interspersed among the females.
d. Section of female gall.
- Fig 3. *Brachyscelis (?) Beyerivæ*, spec. nov. Natural size.
a, e. Female galls, in various stages of growth.
d. Section of small mature gall, showing the cavity, &c.
- Fig. 4. *Ascelis (?) multitudinea*, spec. nov. Natural size.
a. Mature and young galls, as appearing when dried.
b. Female gall, after being soaked in water.
c. Section of same, showing cavity and channel.
d. Female insect, natural size and magnified.

